



NOV 27 2006

10CFR50.73

LR-N06-0442

U.S. Nuclear Regulatory Commission
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Washington DC 20555-001

LER 311/06-003
Salem Nuclear Generating Station Unit 2
Facility Operating License No. DPR-75
NRC Docket No. 50-311

SUBJECT: Manual Reactor Trip Due to Elevated Reactor Coolant Pump Seal Leakoff

This Licensee Event Report, "Manual Reactor Trip due to Elevated Reactor Coolant Pump Seal Leakoff," is being submitted pursuant to the requirements of the Code of Federal Regulations 10CFR50.73(a)(2)(iv)(A).

The attached LER contains no commitments. Should you have any questions or comments regarding this submittal, please contact Justin Wearne at 856-339-5081.

Sincerely,

A handwritten signature in black ink, appearing to read "C. Fricker", written over the word "Sincerely,".

Carl J. Fricker
Salem Plant Manager

Attachments (1)

IE22

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LR-N06-0442

C Mr. Samuel Collins, Administrator - Region I
 U. S. Nuclear Regulatory Commission
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 King of Prussia, PA 19406

 U. S. Nuclear Regulatory Commission
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 USNRC Senior Resident Inspector - Salem (X24)

 Mr. K. Tosch, Manager IV
 Bureau of Nuclear Engineering
 P.O. Box 415
 Trenton, NJ 08625

FORM 366 (6-2004)		U.S. NUCLEAR REGULATORY COMMISSION APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007																																					
LICENSEE EVENT REPORT (LER) (See reverse for required number of digits/characters for each block)		Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov , and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.																																					
1. FACILITY NAME Salem Generating Station – Unit 2		2. DOCKET NUMBER 05000311	3. PAGE 1 of 4																																				
4. TITLE Manual Reactor Trip Due to Elevated Reactor Coolant Pump Seal Leak-off																																							
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FACILITY NAME Justin Wearne, Licensing Engineer		TELEPHONE NUMBER (include Area Code) 856-339-5081																																					
13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT																																							
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) <p>On September 26, 2006 at 1513, with Salem Unit 2 in an end of cycle (EOC) coast down at 94% power, a manual reactor trip was performed due to elevated seal leak-off flows on 21 Reactor Coolant Pump (RCP). The 21 RCP number one seal leak-off flow exceeded the pump trip criteria of greater than 6 gpm. The reactor trip actions and plant recovery were performed without complications.</p> <p>A root cause team determined that the most probable cause is the combination of dissolved oxygen being introduced into a low boron and low lithium Reactor Coolant System which caused corrosion products to become dislodged from the system and deposited onto the RCP seals. Corrective actions are to improve procedures to better cope with EOC chemistry conditions.</p> <p>This report is being made in accordance with 10CFR50.73(a)(2)(iv)(A), "any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)."</p>																																							

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

PLANT AND SYSTEM IDENTIFICATION

Westinghouse - Pressurized Water Reactor

Reactor Coolant Pump Seal {AB/P}

* Energy Industry Identification System (EIS) codes and component function identifier codes appear in the text as {SS/CCC}.

IDENTIFICATION OF OCCURRENCE

Event Date: 09/26/06

Discovery Date: 09/26/06

CONDITIONS PRIOR TO OCCURRENCE

Salem Unit 2 was in Mode 1 at 94% power. Reactor power was reduced for end of cycle coastdown. RCS boron concentration was 8 ppm and lithium was 0.36 ppm.

No structures, systems or components were inoperable at the time of the discovery that contributed to the event.

Prior to the reactor trip, the plant was in the process of restoring from a maintenance activity that replaced the reactor coolant filter with the larger size micron filter that is used during outages. The restoration included return of a mixed bed demineralizer, which had been isolated for the filter replacement.

DESCRIPTION OF OCCURRENCE

In preparation for an upcoming refueling outage, the Reactor Coolant filter for Salem Unit 2 was replaced with a larger micron size filter. This filter was properly returned to service at 1445 on 9/26/06. Shortly thereafter, at 1450, the 21 mixed bed demineralizer was properly returned to service as a subsequent step directed by the procedure that restores the Reactor Coolant filter. Immediately following the demineralizer return to service, all RCP seal leak-off flows increased. An alarm for high 21 RCP seal leak-off flow was received and the station abnormal procedure was entered. In an attempt at recovery, the 21 mixed bed demineralizer was bypassed and the order was given to bypass the Reactor Coolant filter. A momentary decrease in all seal leak-off flow was observed; however, this reduced flow was momentary and all flows subsequently increased. The leak-off for 21 RCP seal subsequently increased above the RCP trip criteria of 6 gpm. The control room performed a manual reactor trip at 1513, and stopped 21 RCP. The reactor trip actions and plant recovery were performed without complications. During the transient, 22-24 RCP leak-off flows also increased, but remained below the RCP trip criteria. The 21 RCP seal leak-off was isolated per the procedure. Following the reactor trip and restoration of 21 RCP seal leak-off, all RCP seal leak-off flows returned to a normal value.

CAUSE OF OCCURRENCE

The excessive RCP seal leak-off flow was caused by dissolved oxygen introduced into the primary system when the RCS filter was returned to service along with the cooler water that was introduced from the isolated components. The RCS filter was properly filled and vented, but oxygen was entrained in the filter material and was subsequently released into the RCS when the filter was placed in service. End-of-cycle chemistry was being maintained at 8 ppm boron and 0.36 ppm lithium. With near zero boron and low lithium, primary chemistry has little capability to

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

CAUSE OF OCCURRENCE (continued)

accommodate or buffer changes to primary pH resulting from the introduction of oxygenated water. Corrosion product solubility is dependent on the oxygen concentration of the bulk fluid. This condition led to localized changes to the corrosion product solubility that resulted in deposition on the RCP seal face. This change in seal geometry resulted in higher seal leakoff.

The EOC chemistry conditions have the potential to accentuate system upsets during such evolutions as changing Reactor Coolant filters, bypassing or placing in service demineralizers and operation with deborating resin beds. These operations allow for oxygen introduction and cooling of isolated loops that could impact reactor plant chemistry and led to an unanticipated corrosion product release from associated downstream components due to solubility changes.

All RCPs experienced elevated seal leak-off during the transient; however, 21 RCP had the highest leak-off. This is attributed to the fact that 21 RCP was the oldest seal package. Similar to industry and vendor information, the magnitude of the change in seal leak-off rate during this transient was proportional to the age of the RCP seal.

The 21 RCP seal assembly was inspected during 2R15, which commenced on October 10, 2006. There was no abnormality noted on number one seal during the inspection.

PREVIOUS OCCURRENCES

A review of reportable events for Salem Generating Station for the last three years was performed. There have been no similar occurrences of elevated RCP seal leak-off due to RCS chemistry at Salem Station.

SAFETY CONSEQUENCES AND IMPLICATIONS

There were no actual safety consequences associated with this event. During the manual reactor trip all systems operated as designed.

The elevated seal leak-off had no safety consequences due to the design of the Salem RCP seals which consists of three in-series seals. The elevated seal leak-off past the first seal was contained in the primary system. The number two and three seals showed no signs of degradation during the event and there was no loss of coolant inventory. The leakage from number one seal was well within the capacity of the charging system. The vendor recommendation for a RCP trip on elevated seal leak-off is based on indication of an abnormal operation of the number one seal. The recommendation is to shutdown the RCP in this case, to establish a static condition for the number two seal to perform the function of the number one seal if necessary. These recommendations are preventative to preclude damage to the seal package.

A review of this event determined that a Safety System Functional Failure (SSFF) as defined in NEI 99-02, Regulatory Assessment Performance Indicator Guidelines, did not occur.

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

CORRECTIVE ACTIONS

1. Immediate corrective actions were taken to increase sensitivity to and minimize activities that could potentially cause a perturbation in RCS chemistry while at low boron (<100 ppm) concentrations for the remaining operating cycle until the refueling outage.
2. An adverse condition monitoring plan was established that provided for increased monitoring of RCS chemistry and RCP pump parameters for the remainder of the EOC coastdown.
3. Actions are being taken to identify activities that can impact RCS pH and to better accommodate EOC chemistry including procedure revisions for Reactor Coolant filter replacement.
4. Training will be conducted for various station departments regarding implications of end-of-cycle chemistry conditions associated with coastdown.

COMMITMENTS

This LER contains no commitments